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## THE SPECIES OF THE ORTHOPTERAN GENUS DEROTMEMA.

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THE genus *Derotmema* was founded by me in 1876 upon a single species found in northern New Mexico. Eight years afterward Saussure, who had not seen this species, added two others, regarded as new, one of which has since turned out to be identical with a species described in 1871 by Thomas as an *Ædipoda* coming from Colorado and Wyoming. None have since been added to the list, but I have for a long time had in my possession other new species, mostly collected by me in the Rocky Mountain region; and recently Mr. A. P. Morse has brought home from the Pacific coast still others, so that I am now able to refer eight species to this genus.

They easily fall into two groups, in one of which the insects are of relatively small size with very prominent eyes and rather long antennæ; the tegmina are distinctly tapering with nearly straight costa and the intercalary vein subequidistant from the median and ulnar veins; while their more conspicuous markings are confined to the costal and inner edges. In the other, the insects are of larger size, with normal eyes and rather shorter antennæ; the tegmina do not taper, the costa is arched, and the intercalary vein approaches the median much more closely than the ulnar vein; while the markings are in no way especially attached to the margins of the tegmina. In both, the wings are colored at the base and crossed by an extramesial fuscous band.

Saussure (*Prodr. Ædip.*, 154, note) has pointed out that a more correct derivative from the Greek words forming the basis of the generic name would be *Tmetodera*, and accordingly I apply this term to one of these two main groups, but not the typical one, for which latter the original form is retained.

*Derotmema* is a desert-inhabiting genus of slender *Ædipodinae*, found largely on and about sage-brush and often simulating it in color. It is confined to the western half of the United States, from the western margin of the Great Plains bordering the Rocky Mountains to the Pacific.

Forms with the hind margin of the pronotum angulate predominate eastwardly, those with this margin rounded or very obtusangulate predominate westwardly. The prevalent color of the base of the hind wings is pale yellow or citron, but one species in the extreme east has this area generally red, while in one found in the extreme west it is usually pale blue, though both species have sometimes the normal yellow of the genus.

The species may be separated by the following table : —

#### TABLE OF THE SPECIES OF DEROTMEMA.

*A*<sup>1</sup>. Smaller forms; eyes very prominent; tegmina distinctly tapering, with nearly straight costa, the intercalary vein subequidistant between median and ulnar veins; the more conspicuous markings of tegmina generally confined, and that narrowly and subequally, to the costal and inner edges. . . . [DEROTMEMA PROPER.]

*b*<sup>1</sup>. Metazona broad, the hind margin rounded, rarely feebly obtusangulate.

*c*<sup>1</sup>. Dark band of wings normally broader than the metazona, reaching the margin posteriorly and percurrent, or broken only in the posterior axillary area.

1. *laticinctum*.

*c*<sup>2</sup>. Dark band of wings narrower than the metazona, not reaching the margin posteriorly and lacking almost throughout the axillary area. . . . 2. *delicatulum*.

*b*<sup>2</sup>. Metazona, even in female, no broader or scarcely broader than at eyes, the hind margin distinctly angulate.

*c*<sup>1</sup>. Rugosities of metazona wholly irregular and not longitudinally pectinate; dark band of wings relatively narrow, nowhere broader and generally narrower than length of pronotum, more or less narrowed in the posterior axillary area, and never occupying more but generally less than half the outer half of the wing; base of wings pale blue or citron.

*d*<sup>1</sup>. Metazona rectangulate or feebly obtusangulate posteriorly (rarely in female considerably obtusangulate); costal margin of tegmina with dull fuscous and ashen tints in no way conspicuously contrasted; basal half of wings normally pale citron, occasionally subhyaline. . . . 3. *cupidineum*.

*d*<sup>2</sup>. Metazona very obtusangulate posteriorly; costal margin of tegmina with vivid contrasts of black and pallid, giving it an ornate appearance; basal half of wings normally pale blue, occasionally pale citron.

4. *saussureanum*.

*c*<sup>2</sup>. Rugosities of metazona forming longitudinal ridges giving it a pectinate appearance; dark band of wings broad, subequal, much broader than length of pronotum and occupying more than half the outer half of wing; base of wings red or citron. . . . . 5. *haydeni*.

*A*<sup>2</sup>. Larger forms; eyes less prominent, especially in female; tegmina of subequal breadth, with arched costa, the intercalary vein closely approaching the median and widely separated from the ulnar vein; costal and inner edges of tegmina not marked distinctively from the rest of the wing. . [TMETODERA.]

*b*<sup>1</sup>. Disk of pronotum relatively smooth, posteriorly obtusangulate; tegmina with contrasted markings on costal half, in large patches as in *Conozoa*.

6. *rileyianum*.

b<sup>2</sup>. Disk of pronotum tuberculate, its hind margin rectangulate, rarely feebly obtusangulate; tegmina with almost uniformly distributed markings, consisting largely of longitudinal streaks or fleckings following the longitudinal veins, rarely so arranged as to form massive blotches and then inconspicuous and simulating *Trimerotropis* rather than *Conozoa*.

c<sup>1</sup>. Hind wings broad in the radiate area, after the manner of *Circotettix*, so that they are more than three fifths as broad as long; tegmina flecked throughout rather than streaked. . . . . 7. *lentiginosum*.

c<sup>2</sup>. Hind wings of normal form, rarely more than four sevenths as broad as long; tegmina beyond the basal fourth marked almost exclusively with longitudinal streaks. . . . . 8. *lichenosum*.

### (Subgenus DEROTMEMA.)

#### 1. *Derotmemia laticinctum*, sp. nov.

Of relatively small size, fusco-cinereous, flecked with fuscous. Head with prominent subglobose eyes, the occiput ascending, more or less clearly separated from the descending fastigium of the vertex by a transverse ridge; fastigium rather broad and depressed between high lateral walls, traversed by a slight median carina, the lateral walls converging anteriorly and continuous with the lateral margins of the frontal costa, which is narrow and deeply sulcate above, but broadened at ocellus and particularly at base; lateral carinae of face strongly divergent below; antennae somewhat longer (♂) or somewhat shorter (♀) than the hind femora, the joints, or most of them, alternately pallid and fuscous. Pronotum cinereous, more or less flecked with fuscous, mesially constricted so as to be subselliform, the metazona broad, generally broader than at the eyes, its posterior margin very broadly rounded, with no or scarcely a trace of angulation mesially; disk of metazona generally smooth or nearly so, but sometimes, at least in the female, distinctly rugulose, the lateral carinae distinct, but fading on the prozona. Tegmina long, slender and tapering, strongly rounded apically, cinereous, heavily flecked with fuscous along front and hind margins, and with some slender streaks apically along the longitudinal veins, the intercalary vein subequidistant from median and ulnar veins; wings citron yellow at base, hyaline apically with some fuscous clouds or maculations at extreme apex, and with a broad extramesial fuscous band, normally broader than the metazona, percurrent or broken only in the posterior axillary area, reaching and including the hind border but not attaining the anal angle, and leaving free three lobes of the radiate area apically, in the axillary area sending a shoot half way to the base. Hind femora cinereous, blotched or fasciate with fuscous.

Length of body, ♂, 14 mm., ♀, 22 mm.; antennæ, ♂, 11 mm., ♀, 9 mm.; tegmina, ♂, 16.5 mm., ♀, 22.25 mm.; hind femora, ♂, 9 mm., ♀, 12 mm.

30 ♂, 28 ♀. Las Cruces, N. Mex., T. D. A. Cockerell, C. H. T. Townsend; Mesilla, N. Mex., June 30, A. P. Morse; Phoenix, Ariz., Oct. 16, T. D. A. Cockerell; Fort Whipple, Ariz., E. Palmer; forty miles east of Tucson, Ariz., E. Palmer.

Mr. A. P. Morse found this species common at Mesilla on dry soil, especially on sandy ground. It flies freely and is not easily caught.

## 2. *Derotmema delicatulum*, sp. nov.

Of relatively small size, pallid testaceous, occasionally tinged with rufous, flecked more or less with fuscous. Head with the face often hoary in the male, with prominent subglobose eyes, occiput, fastigium and frontal costa exactly as in the last species; antennæ as long as (♂) or considerably shorter than (♀) the hind femora, pallid, interrupted with fuscous. Pronotum testaceous, often more or less rufescent in female, flecked more or less with fuscous, somewhat selliform especially in the male, the metazona broad, generally broader, especially in the female, than at the eyes, its posterior margin very broadly rounded, but occasionally showing signs of angulation mesially, the disk nearly smooth but generally with raised points and occasionally slightly rugose in the male, distinctly and rather sharply rugose in the female, the lateral carinæ rather distinct but fading on the prozona. Tegmina slender and tapering, marked as in the last species and with similar intercalary vein; wings pale citron yellow at base, hyaline apically, with a slight infuscation of the veins at extreme apex and a narrow and somewhat cloudy extramesial fuscous band, narrower than the metazona, almost completely interrupted in the axillary area though sending in its upper portion a short shoot toward the base, and by a trifle failing posteriorly to include the hind margin, leaving at least four lobes of the radiate area free. Hind femora cinereo-testaceous, obliquely and obscurely fasciate with fuscous.

Length of body, ♂, 14 mm., ♀, 22 mm.; antennæ, ♂, 8.75 mm., ♀, 9 mm.; tegmina, ♂, 15.5 mm., ♀, 21 mm.; hind femora, ♂, 8.75 mm., ♀, 12.5 mm.

5 ♂, 3 ♀. Lancaster, Cal., July 31, A. P. Morse; Mohave, Cal., Aug. 1, A. P. Morse; between Gila Bend and Yuma, Ariz., July 4, A. P. Morse.

3. *Derotmema cupidineum*.

*Derotmema cupidineum* Scudd., Ann. Rep. Chief Eng., 1876, 513 (1876); Sauss., Prodr. *Ædip.*, 156-157 (1884).

The type of the genus, and originally described from northern New Mexico. I have since taken it on different western trips at Green River and Alkali, Wyo., July 27; at White River, Col., near the Utah boundary, July 24, Aug. 3; and at Castle Gate, Utah, Aug. 22. It is one of the smallest species of the genus.

4. *Derotmema saussureanum*, sp. nov.

*Derotmema saussureanum* Bruner!, MS.

Of relatively small or medium size, fusco-testaceous, much mottled with fuscous. Head with prominent subglobose eyes, followed centrally by a fuscous stripe, the face often wholly or largely hoary, the form and sculpturing of the occiput, vertex and front agreeing perfectly with the two species described above; antennæ as long as (♂) or somewhat shorter than (♀) the hind femora, rufous, banded with fuscous, distinctly in the male, obscurely in the female. Pronotum fusco-testaceous more or less ferruginous, the lateral lobes margined below with hoary and marked from the centre toward the lower posterior angle with a bright white attenuated oblique stripe margined with black; prozona mesially constricted, at least in the male, so as to be subselliform, the metazona scarcely or not so broad as at the eyes, its disk sparsely and irregularly rugulose, often in the male nearly smooth, the hind margin very obtusangulate, the angle distinct. Tegmina long, slender, and tapering, dull ferruginous becoming subpellucid apically, the fore and hind margins flecked alternately with dark fuscous and pallid, the contrasts between which are vivid on the costal margin; intercalary vein subequidistant between the median and ulnar veins: wings either pale blue\* or pale citron at the base, pellucid at apex, with some infuscation of the veins at the extreme tip, and crossed by an extramesial, moderately broad and solid blackish band, narrowed at the axillary area, nowhere broader than the length of the pronotum, occasionally broken at the lower margin of the axillary area, in that area sending a short spur baseward, attaining the hind margin but not the anal angle, leaving two to three lobes of the radiate area free, and not occupying in all more than half the outer half of the wing. Hind femora ferrugineo-testaceous, fasciate with

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\* The tint as in the European *Ædipoda cærulescens* or paler than that of our *Leprus wheeleri*.

fuscous and especially with a strongly oblique forward directed median stripe.

Length of body, ♂, 14 mm., ♀, 19.5 mm.; antennæ, ♂, 9.5 mm., ♀, 10.5 mm.; tegmina, ♂, 15.5 mm., ♀, 20.25 mm.; hind femora, ♂, 9.5 mm., ♀, 12.25 mm.

45 ♂, 34 ♀. California, in the following localities: San Bernardino, July 16; Colton, July 17; Cahon Pass, July 18; San Diego, July 22; Coronado, July 24; Los Angeles, July 26; Rubio Wash, Altadena, July 29, — all the above collected by A. P. Morse; and Anaheim, Coquillett (Bruner).

Specimens with blue hind wings come from all the above localities except Cahon Pass and Anaheim; those with yellow hind wings come from these two localities, and also from San Diego, San Bernardino and Altadena.

#### 5. *Derotmema haydeni*.

*Ædipoda haydeni* Thom., Ann. Rep. U. S. Geol. Surv. Terr., v. 460-461 (1871).

*Derotmema haydeni* Brun., Ann. Rep. Nebr. Bd. Agric., 1896, 132 (1897).

*Derotmema brunnerianum* Sauss., Prodr. *Ædip.*, 155-156 (1884).

First described by Thomas from Colorado and Wyoming, and credited by Bruner to the Yellowstone and Nebraska and by Saussure to Colorado. I have specimens before me from Colorado, 5500', Morrison; Cañon City, Col., P. R. Uhler; Alpine, Tex., June 26, and Sierra Blanca, Tex., A. P. Morse; and have myself taken it at Lakin, Kans., Sept. 1, and in the following localities in Colorado: Cucharas, July 8-9; Pueblo, Aug. 31; between Pueblo and Veta Pass, Aug. 27; and Garland, Aug. 28-29.

The color of the base of the hind wings is sometimes red and sometimes citron. Specimens at hand with the latter color come from Cucharas and Garland, Col., and from the two Texan localities; those with red wings from all the localities excepting Sierra Blanca, Tex.

A yellow-winged female of this species, taken at Garland, was observed in flight to produce from six to ten short sharp clicks in rapid succession, like the ticking of a watch but much faster.

(Subgenus *TMETODERA*.)

#### 6. *Derotmema rileyianum*.

*Derotmema rileyianum*, Sauss., Prodr. *Ædip.*, 156 (1884).

Originally described from Idaho. "Salm Co." is given by Saussure, but there is no such county, and probably Salmon City in Lemhi Co.

was meant. I have specimens from Humboldt Station, Nevada, Green River, July 21–31, and Alkali, Wyo., July 27; Salt Lake Valley, Utah, Aug. 1–4, and White River, Col., next the Utah border, July 24–Aug. 3, all but the first taken by myself. I consider this, rather than either of the following, to be the species described by Saussure, principally from the wider angle of the hind border of the pronotum, and the band of the wings more noticeably broken at its crossing by the veins.

7. *Derotmema lentiginosum*, sp. nov.

Of relatively large size, fusco-testaceous, much flecked with fuscous. Head not very prominent, much infuscated above the clypeus, the fastigium of vertex deeply channelled between high walls which gradually approximate both in front and behind, and with a distinct median carina; frontal costa relatively narrow, subequal but gently expanding at base, sulcate throughout, its margins continuous with the walls of the fastigium; eyes only moderately prominent; antennæ scarcely so long as (♂) or much shorter than (♀) the hind femora, ferrugineo-testaceous, very obscurely banded with fuscous. Pronotum ferrugineo-fuscous, flecked with fuscous and especially marked on the lateral lobes with a broad fuscous bar, darkest below, inclosing a narrow one of testaceous, the lateral carinæ sharp and distinct on the metazona, the disk of which is rather delicately ruguloso-tuberculate with a slight pectinate appearance, its hind margin rectangular or in the male sometimes slightly acutangulate. Tegmina shaped as in *Trimerotropis*, with arched costa, cinereo-fuscous, with nearly uniformly distributed rather coarse fuscous fleckings, sometimes obscurely grouped into patches near the base and middle, rarely very obscurely streaked longitudinally in the apical half, the intercalary vein approaching the median much more closely than the ulnar vein; wings broad and full in the radiate area, somewhat after the manner of *Circotettix*, being about three fifths as broad as long; they are very pale citron at base, apically hyaline but with nearly all the veins and cross-veins irregularly infuscated, and with a moderately narrow generally unequal and percurrent but more or less interrupted extramesial fuscous band, narrowest just below the axillary area, and in the latter sending an offshoot half way to the base. Hind femora ferrugineo-testaceous, rather obscurely fasciate with fuscous.

Length of body, ♂, 19.5 mm., ♀, 25 mm.; antennæ, ♂, 9 mm., ♀, 8.5 mm.; tegmina, ♂, 23 mm., ♀, 26 mm.; hind femora, ♂, 10 mm., ♀, 12 mm.



10 ♂, 2 ♀. South Park, Col., Aug. 11-16; Garland, Col., Aug. 28-29, collected by myself.

8. *Derotmema lichenosum*, sp. nov.

Of relatively large size, fusco-cinereous, much marked with fuscous and ferruginous. Head not very prominent, the face much mottled with cinereous and fuscous, generally darker above the clypeus, the fastigium and frontal costa much as in the last species; eyes only moderately prominent even in the male; antennæ about as long as (♂) or much shorter than (♀) the hind femora, ferruginous, distinctly banded with fuscous. Pronotum cinereo-fuscous, often flecked or blotched with bright ferruginous (simulating the rusty lichens of the sage-brush) on the disk, the lateral lobes with markings similar to those of the last species; lateral carinæ sharp and distinct, at least on the metazona, the disk of which is granuloso-rugose, its posterior margin rectangulate, rarely feebly obtusangulate. Tegmina shaped as in *Trimerotropis*, with arched costa, cinereous, marked with fuscous nearly uniformly distributed in slender streaks and patches, showing a decided longitudinal tendency, especially in the distal three fourths where they follow interruptedly the course of the longitudinal veins; occasionally an obscure tendency is seen to their grouping basally, as common in *Trimerotropis*; the intercalary vein approaches the median much more closely than it does the ulnar vein; wings marked quite as in the last species, the band as there reaching the hind margin but not the anal angle, and leaving three lobes of the radiate area free; but they are of the normal form, not full in the radiate area and rarely more than four sevenths as broad as long. Hind femora cinereo-testaceous, rather obscurely fasciate with fuscous.

Length of body, ♂, 21 mm., ♀, 26.5 mm.; antennæ, ♂, 10.5 mm., ♀, 10 mm.; tegmina, ♂, 24 mm., ♀, 28.25 mm.; hind femora, ♂, 10.75 mm., ♀, 13 mm.

40 ♂, 14 ♀. Alkali, Wyo., July 27; Green River, Wyo., July 21-31; between Green River and Evanston, Wyo., July 31; Evanston, Wyo., Aug. 6; Fossil, Wyo., Sept. 2; Castle Gate, Utah, Aug. 22; White River, Col., at the Utah border, July 24-Aug. 13; Florissant, Col., Aug. 17-22; South Park, Col., Aug. 11-16; Garland, Col., Aug. 28-29, all collected by myself.

The species was much more common in the northern of these localities than in the southern, and was found on and about the sage-brush, its colors rendering it most inconspicuous and sometimes showing, especially upon the thorax and occasionally upon the head, rusty patches quite

similar to those, of lichen origin, upon the sage-brush. One could not collect them without observing it.

Both sexes of this grasshopper make a noise in flight. A male, observed at Evanston and repeatedly followed and then captured, made from six to twenty-four clicks in a uniform series at the rate of seventy-two in a minute, or six in five seconds; a female at Alkali made a succession of equidistant clicks, four or five to a second, in a short flight in one direction, lasting only one or two seconds. These observations were made, and most of the specimens collected, in 1877.

NOTE. — Since this article was in type I have found that this last species was described in 1871 by Thomas as *Oedipoda gracilis*. My name will therefore fall.